



I-KOREA 4.0

Korea's **5G** Policy

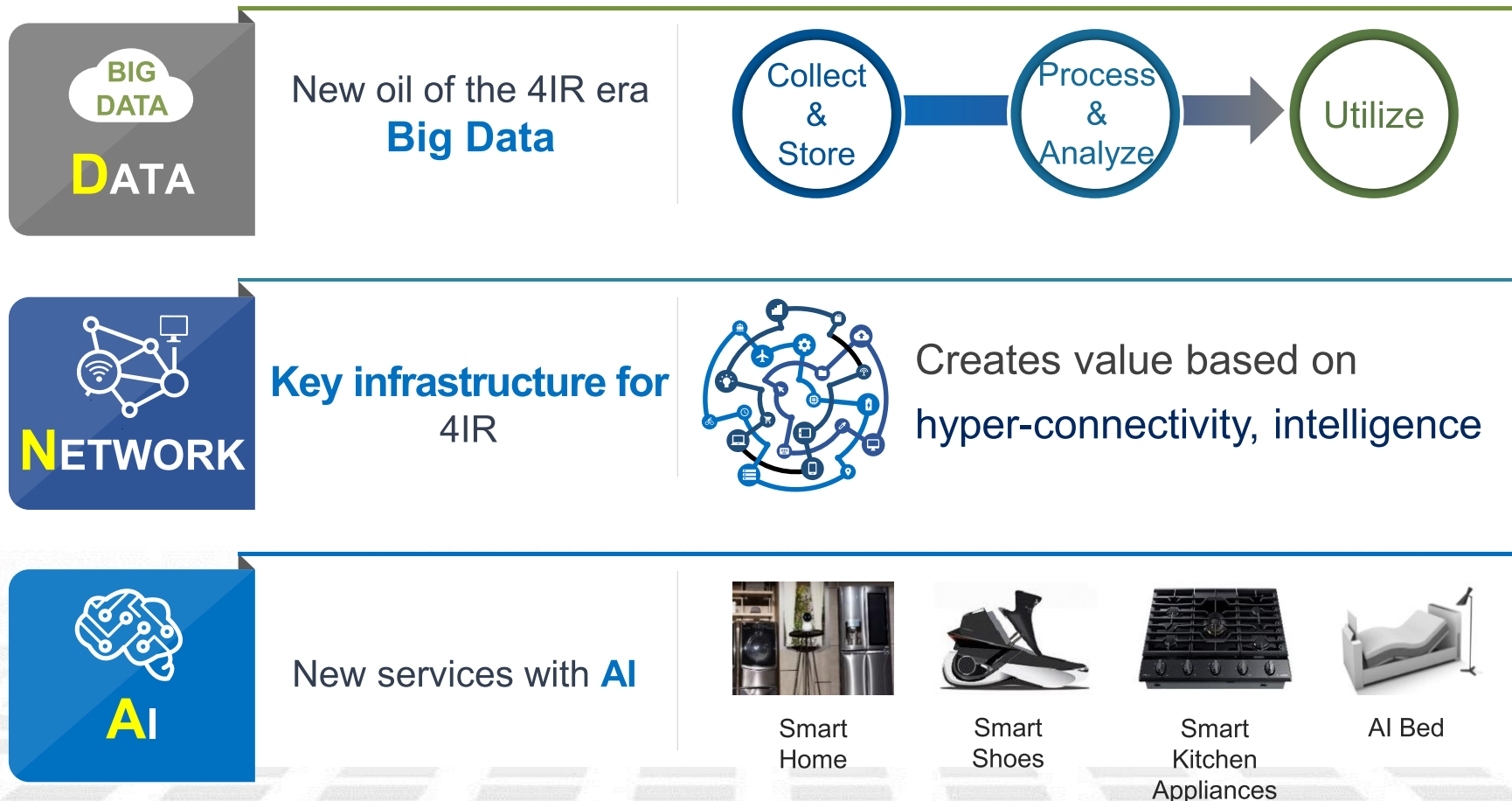
September 2018



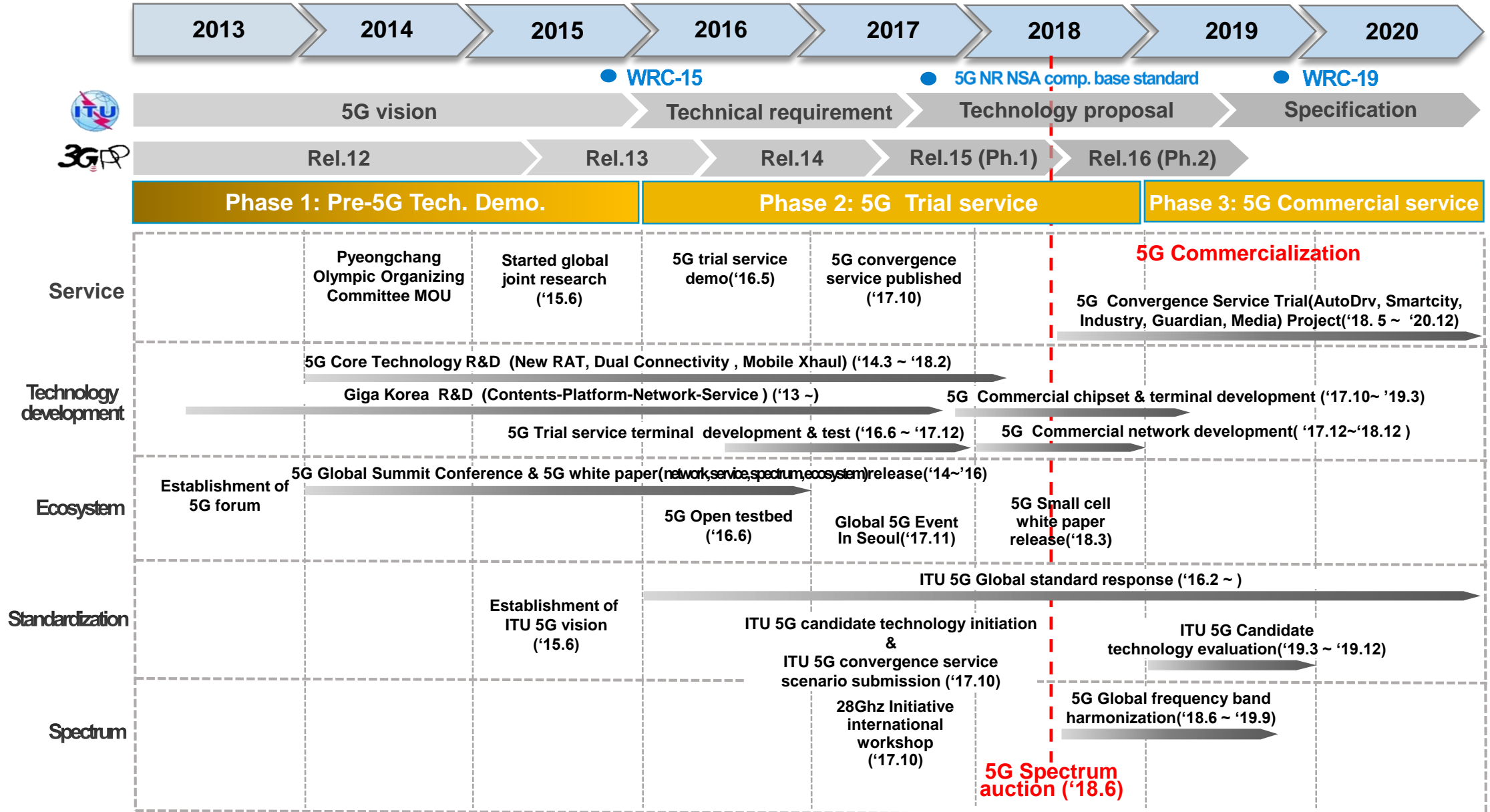
Ministry of Science and ICT

Infrastructure for Hyper-Connectivity = D·N·A

D·N·A determines the speed of 4IR & the magnitude of its effects



Korea's 5G Roadmap :



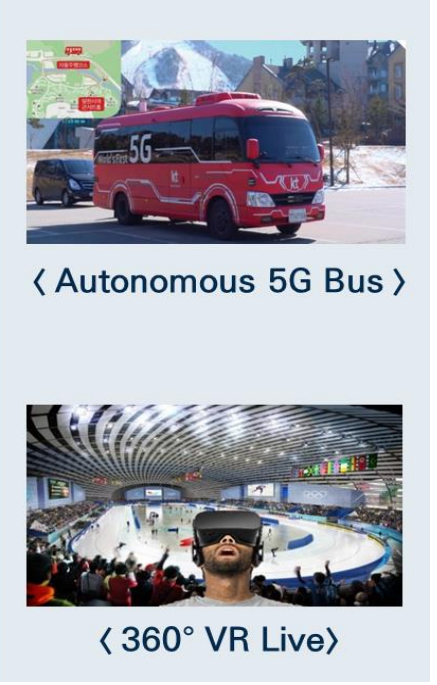
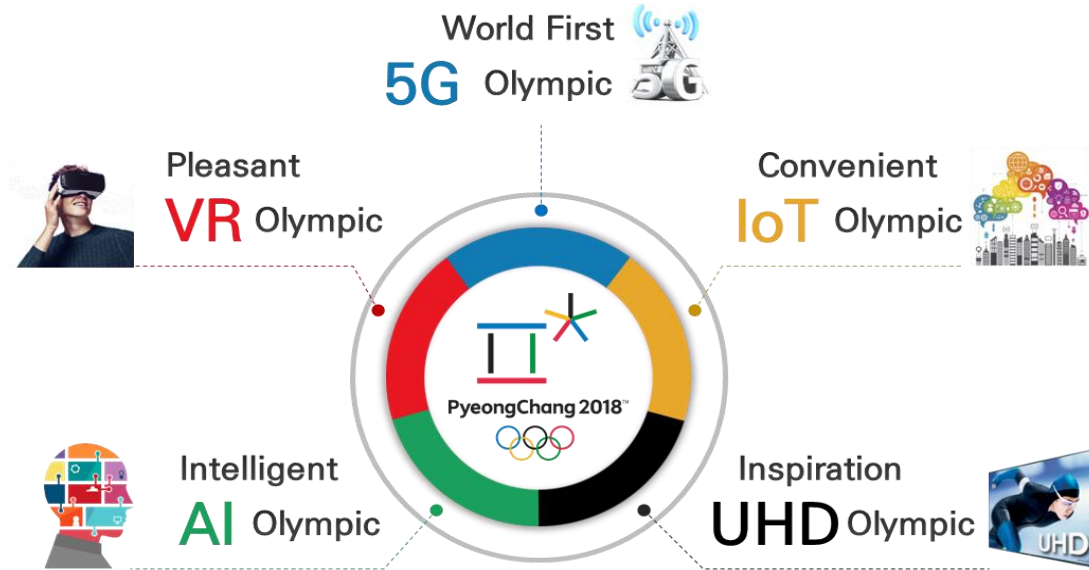
Korea, Gearing Up for the 5G Era :

World's first country to commercialize 5G network in 2019



- 1 PyeongChang 5G trials
- 2 5G spectrum auction
- 3 Joint development & use of 5G network
- 4 5G trials for vertical industries

① PyeongChang 5G Trials : 5 advanced ICT services



① PyeongChang 5G Trials : Service

[4 types of Immersive Media Services at PyeongChang & 5G-based Connected Car]

Olympic Game Services

Sync View



- Bobsled

- TV live Broadcasting
- Olympic Theater

Time Slice



- Figure Skating
- Short Track

Omni View



- Cross-country skiing

- "Omni View" App service
- Olympic experience zone
- 5G terminal service experience

360° VR



- Cross-country skiing
- Short Track
- Olympic Park Scene

- Olympic Theater
- Experience zone

5G-based Connected Car



Transparent Display/AR



5G Control

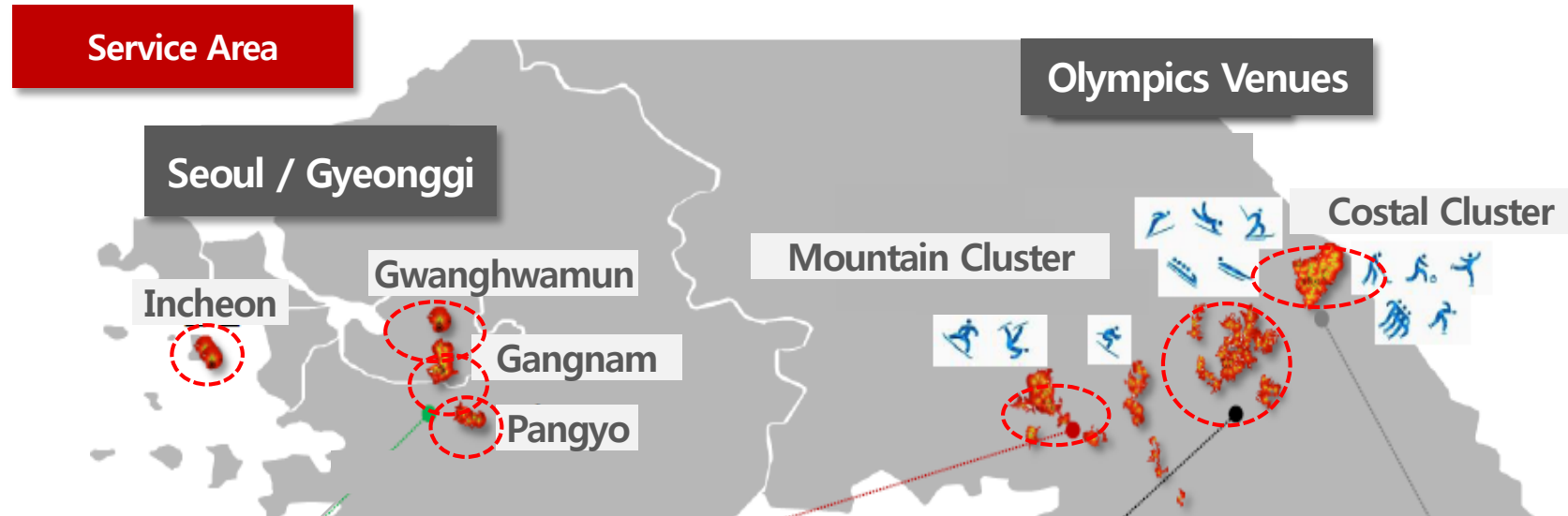


360° VR



Hologram

① PyeongChang 5G Trials : Network



- KT built a pre-standard 5G network operating in 28 GHz band with global vendors for Winter Olympics, and recorded peak speeds of up to 3.5 Gbps on 5G Samsung tablets using the network.

② 5G Spectrum Auction : Goal & Strategy

Goal & Strategy of 5G Spectrum Auction

Goal

Innovation of industry/ service and creation of positive ripple effects
by achieving the world's first 5G commercialization

Detailed Goal and Strategy

1

World's 1ST 5G service

- Accelerate 5G commercialization through early spectrum auction
- More than 30% network deployment within 5 years

2

World's best innovative infrastructure

- Allocate 3.5 GHz and 28 GHz bands at the same time
- Provide maximum available bandwidth 2.68 GHz as continuous broadband

3

Creating a fair competition environment

- Auction design to guide efficient use of frequency
- Set optimal limits to prevent frequency monopoly

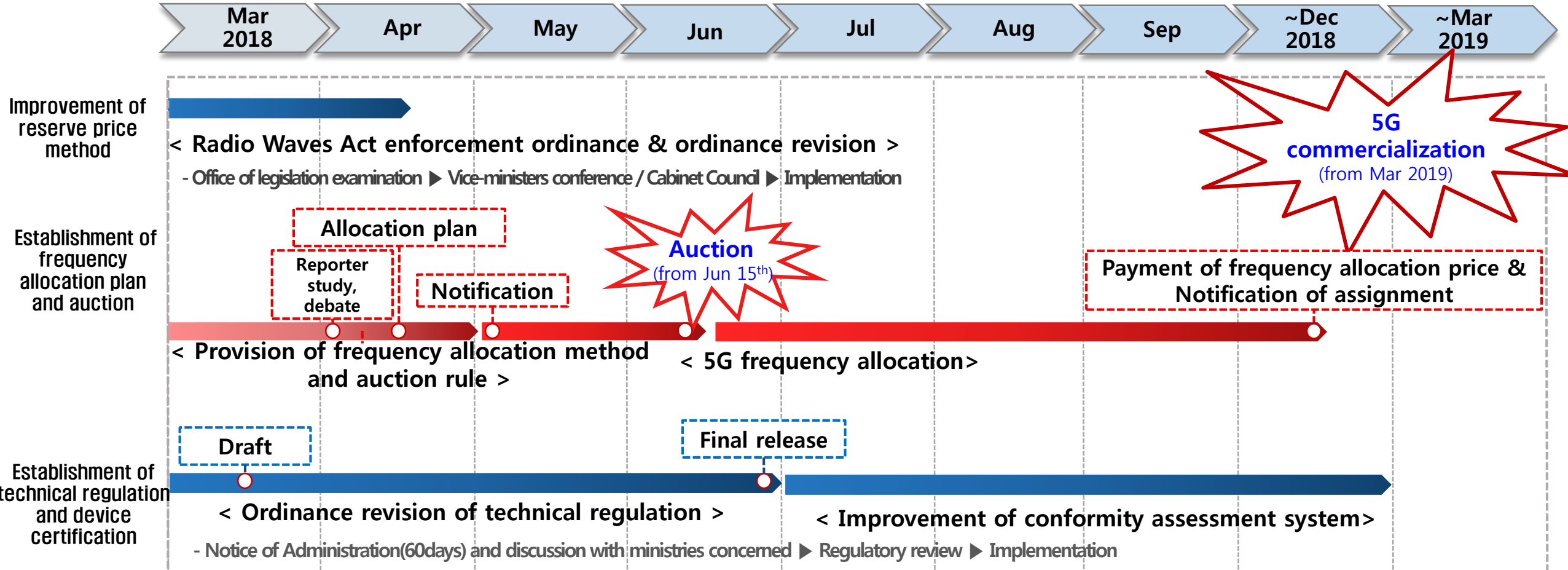
4

Creation of 5G new services

- Innovative plan for 28 GHz band

② 5G Spectrum Auction : Timeline

- » Reserve price setting, establishment and notification of frequency auction plan (~'18. April), auction ('18. June)
- » For conformity assessment, technical regulation (~'18. June), test method (~'18. Dec.)



* The entire process is completed by notification of assignment when the operator makes payment of frequency allocation

② 5G Spectrum Auction : Frequency bands for auction

[Allocating 3.5 GHz and 28 GHz bands at the same time]

3.5 GHz Band (3.42–3.7 GHz) 280 MHz Bandwidth
 28 GHz Band (26.5–28.9 GHz) 2400 MHz Bandwidth
Total 2680 MHz Bandwidth



※ Current status of frequency usage on mobile service (as of April 2018)

	Frequency bands	Total Bandwidth
2G	800 MHz (10 MHz BW), 1.8 GHz Band (20 MHz BW)	30 MHz
3G	2.1 GHz Band (40 MHz BW)	40 MHz
4G	800 MHz (50 MHz BW), 900 MHz (20 MHz BW), 1.8 GHz Band (90 MHz BW) 2.1 GHz Band (80 MHz BW), 2.6 GHz Band (100 MHz BW)	340 MHz
	Total	410 MHz

② 5G Spectrum Auction : 5G network deployment obligation

[Driving more than 30% network deployment within 5 years]

3.5 GHz Band

» The number of stations set as 150,000 in the LTE nationwide network, 15% 3yr. 30% 5yr.

28 GHz Band

» The number of stations(equipment basis) should be set 100,000 unit, 3yr. 15% obligation

Category	Total base stations	Rate of compulsory deployment by year (Cumulated basis)	
		3yr. (15%)	5yr. (30%) (cumulative)
3.5 GHz Band	150,000	22,500	45,000
28 GHz Band	100,000 (equipment basis)	15,000	-

※ Small cell base stations/repeaters mainly produced by SMEs are also included in the base stations

※ For 5G boost, the obligation to deploy a network for auction in 2016 can be done as deployment of 5G (28 GHz band)

※ (Reference) Obligation to deploy a network for auction in 2016

Category	Total base stations	1 st year	2 nd year	3 rd year	4 th year (cumulative)
700 MHz, 2.1 GHz, 2.6 GHz Band (40 MHz BW Block)	106,000 stations	15%	45%	55%	65%
1.8 GHz, 2.6 GHz Band(20MHz BW Block)	106,000 stations	10%	25%	35%	40%

② 5G Spectrum Auction : Results

- ❖ Spectrum auction was held for 2 days (6.15(Fri)~18(Mon)), a total of 2,680MHz in the 3.5GHz and 28GHz was auctioned at 3.61 trillion KRW (\$3.2 billion)

3.5 GHz Band

» 280MHz sold at 2.9 trillion KRW (\$2.69 billion)

Category	SKT	KT	LGU+
Auction band	3.6~3.7GHz	3.5~3.6GHz	3.42~3.5GHz
Auction Price	1.21 trillion KRW (\$1.09 billion)	968 billion KRW (\$870 million)	809.5 billion KRW (\$728 million)

28 GHz Band

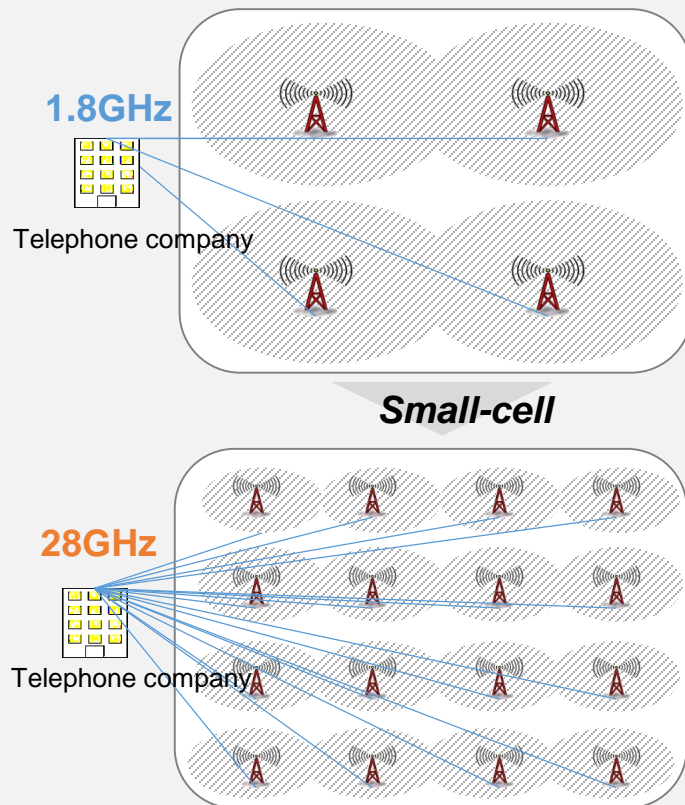
» 2,400MHz sold at 622.3 billion KRW (\$559.5 million)

Category	SKT	KT	LGU+
Auction band	28.1~28.9GHz	26.5~27.3GHz	27.3~28.1GHz
Auction Price	207.3 billion KRW (\$186.5 million)	207.8 billion KRW (\$186.9 million)	207.2 billion KRW (\$186.4 million)

③ Joint development & use of 5G network : Background

**Effective implementation of 5G network
& prevention of overlapping investment for essential facilities**

5G Network : characteristics

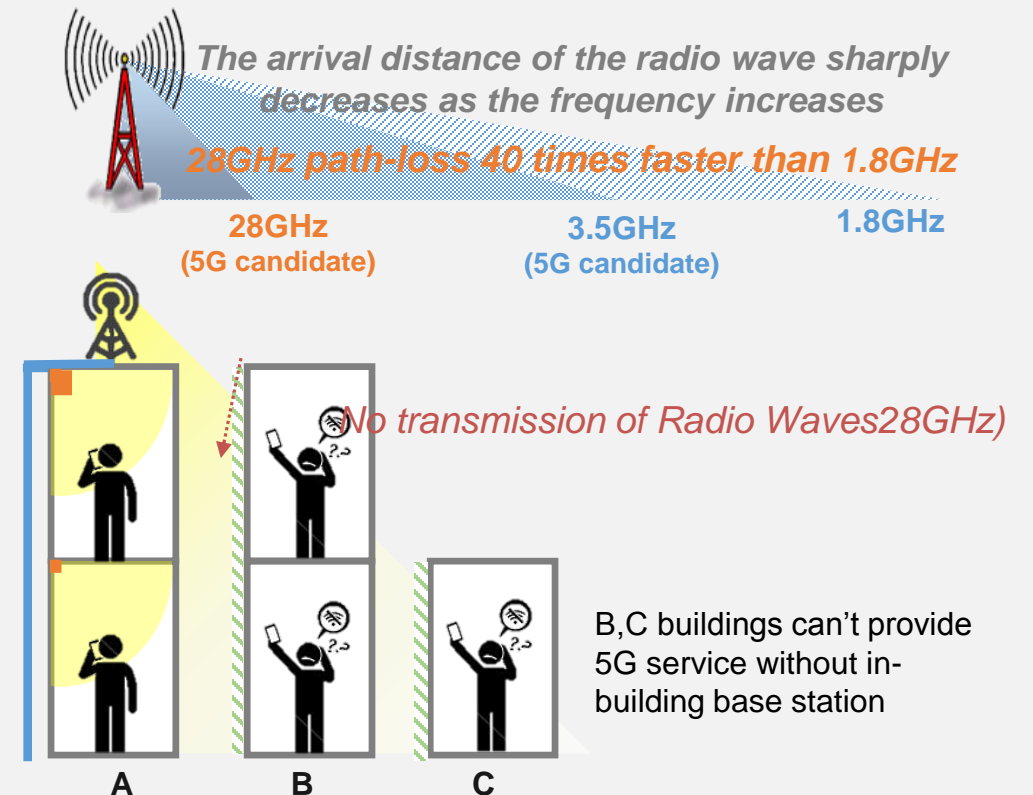


Small-cell

High density small cell required

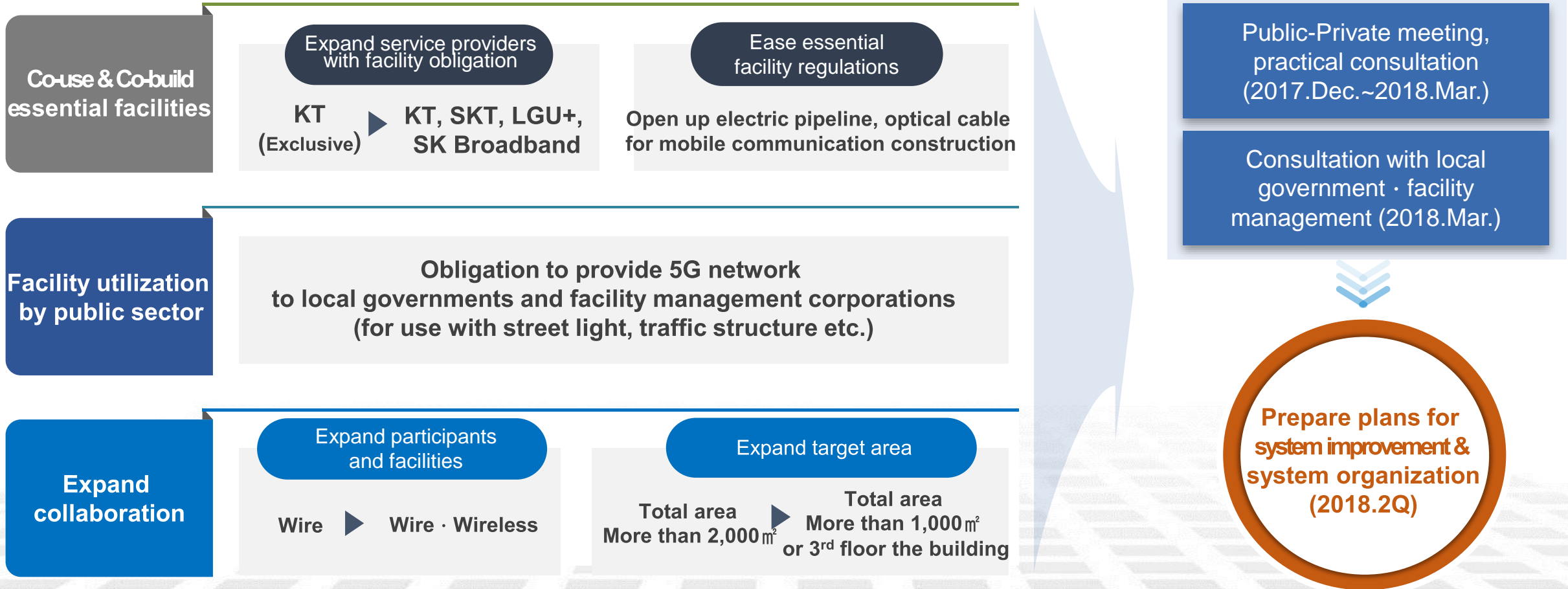
Small cell deployment costs of 50% will be spent on building backhaul

5G Frequency : characteristics



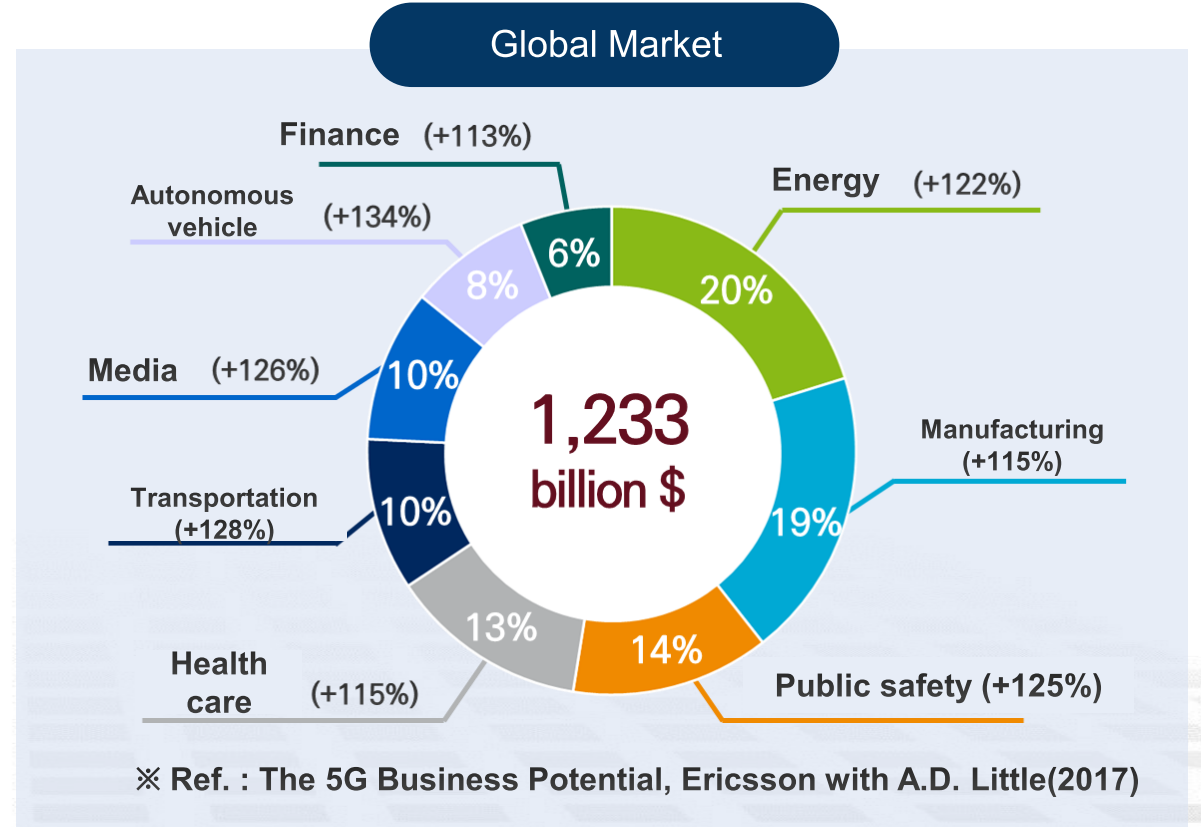
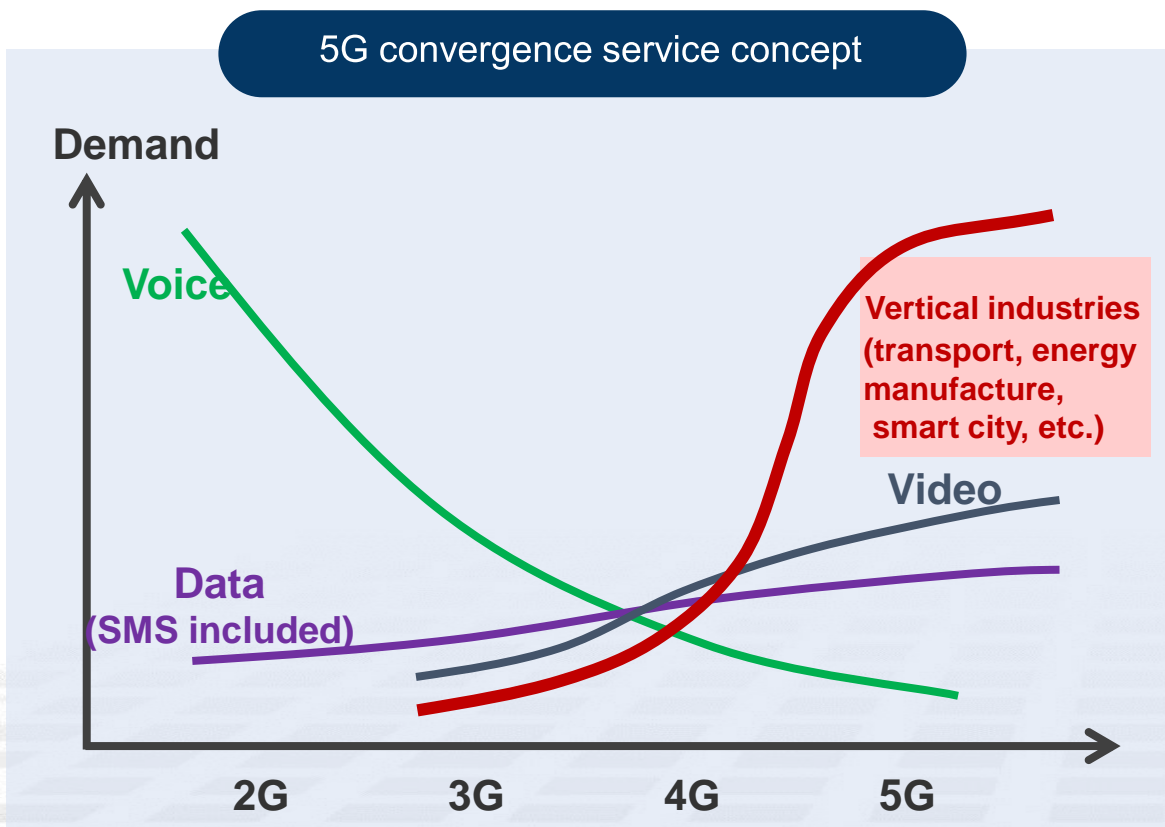
③ Joint development & use of 5G network : Direction

[Improvement system for effective 5G network]



④ 5G trials for vertical industries

Saturation of the traditional mobile service market,
Attention to new 5G service markets linked with vertical industries



④ 5G trials for vertical industries



✓ Support government contribution of 80 million(USD) 2018~2020

✓ 5G convergence service promotion field selection ('17.2Q~4Q)

✓ 5G convergence service business announcement & implementation Agency selection and agreement ('18.1Q~2Q)

1st

year(2018)

- 2019, Target service verification & trial
- 2022, Target service concept design

2nd

year(2019)

- 2019, Target service started trial service
- 2022, Target service component technology

3rd

year(2020)

- 2019 Target service performance & diffusion
- 2022, Target service verification & trial

28 GHz Frontier Workshop Overview (1)

A place to discuss the 28 GHz band for 5G continuously (<http://www.5g-28frontier.org/>)

The screenshot shows the homepage of the 28GHz Frontier website. At the top, there is a navigation bar with the 28GHz logo and menu items: ABOUT, WORKSHOPS, COMMUNIQUE & VIEW, and TECHNOLOGY & INFORMATION. The main header features a blue background with a network diagram and the text "5G Frontier by 28GHz". Below this, a sub-header states: "The 5G 28GHz Frontier is established to promote the use of the frequency range 26.5-29.5GHz for early introduction of 5G mobile communications through policy, trials, development, and commercialization." The main content area includes a section for the "28GHz Frontier 5th Workshop (October 8th, 2018 / Fukuoka, Japan)" with the tagline "Driving Global 5G markets - Continued Progress on the 'Frontier' 28 GHz Frequency Band". Below this are four featured articles with thumbnails and "more" buttons: "Various Countries' Plan", "Trial & Development", "Communique & View", and "Relevant Information". At the bottom, there is a "Supporting Industry" section with logos for NOKIA, intel, 5G GMF, ARIB, TTA, and SKT.

Alphabetical order

📍 Administrations

- Participating: Canada, Japan, **Korea**, Mexico, New Zealand, Singapore, Sweden, USA
- Interesting: Colombia, Egypt

📍 Industries

- MNO: AT&T, KDDI, KT, LGU+, NTT DoCoMo, SKT, Softbank, Verizon
- Manufacturer: Ericsson, Huawei, Intel, LGE, Nokia, Samsung, Qualcomm

📍 Organizations

- 5GMF, ARIB, ITRI, TTA, GSA, GSMA

28 GHz Frontier Workshop Overview (2)

[History to promote 28 GHz for 5G globally and widely]

1st 28 GHz Initiative Workshop

(Dec 2016, Invited by Korea/TTA @Seoul)

- The mobile industry has a common and agreed view to support the **26.5-29.5 GHz (28 GHz) band for early 5G implementation/deployment** by 2017 or early 2018

2nd 28 GHz Initiative Workshop

(Jun 2017, Invited by FCC @Niagara falls)

- Develop a Communique: Supporting the 26.5 – 29.5 GHz as “**5G Frontier band**” for early 5G implementation/development by 2018
- Agree to create a website: <http://www.5g-28frontier.org/>

3rd 28 GHz Frontier Workshop

(Jan 2018, Invited by Korea/TTA @Seoul)

- Develop a Communique: Notifying industry is developing **28 GHz equipment based on 3GPP Rel-15**
- Expanding participants to mobile operators
- Initiate to collaborate 28 GHz issues for HAPS and ESIM

4th 28 GHz Frontier Workshop

(Jun 2018, Invited by IFT @Cancun)

- Develop a Communique: Readiness of 28 GHz band for 5G usage in some countries based on 3GPP Rel-15
- Agree to **collaborate 28 GHz issues for HAPS and ESIM towards ITU/WRC**

Thank You

